

Carolina Biological Supply Company

Open a Can of Worms! Teaching with Carolina's Earthworms

**Marilyn Pendley
Teaching Partner**

Objectives:

- To introduce important milestones in **animal development**
- To use **scientific inquiry** to explore the external and internal anatomy and adaptations of the earthworm

Dissection Without the Harsh Smell:



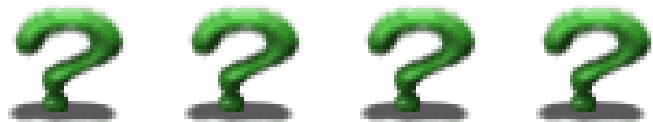
**Ever wish you
could teach
dissection
without the
formaldehyde
odor?**

Carolina Has the **Perfect Solution!**

- **No harsh formaldehyde odor**
- **Use in any classroom or lab**
- **No special ventilation required**
- **Safe for you, your students, and the environment**
- **Nontoxic**
- **No costly disposal**
- **Easy and convenient**

Inquiry Method:

Why?



What's Hard to Hear:

- Most students are not learning much science
- Most science teaching is ineffective K–14
- Teaching and learning science are hard

Pinky Nelson

National Science Standards:

“Students at all grade levels and in every domain of science should have the opportunity to use scientific inquiry and develop the ability to think and act in ways associated with inquiry including using appropriate tools and techniques to gather data.”

The Inquiry...

**Allow questions
to guide the
investigation**



Open Inquiry:

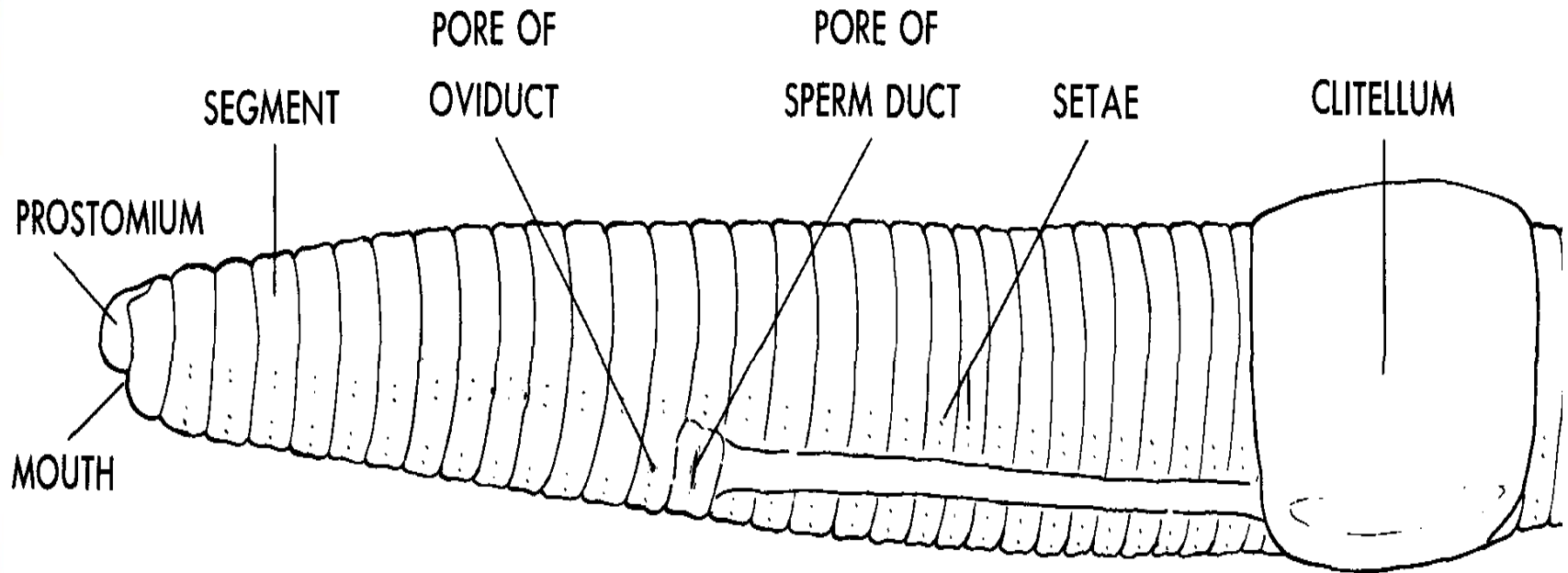
- List what you **already know** about earthworms
- Write down your **questions** about the earthworm
- Ask at least **3 questions** about the earthworm that can be **answered by dissection**

Ecological Importance?



Nature's plow

External Anatomy:



Adaptations for Survival:

Observable

- 1.
- 2.
- 3.

Not observable

- 1.
- 2.
- 3.

Think About Internal Anatomy:

How is the earthworm different from you?	How is the earthworm similar to you?
1.	1.
2.	2.
3.	3.

Review Classification Systems:

Human	Earthworm
Domain: Eukarya	How many groups are shared by these organisms?
Kingdom: Animalia	
Phylum: Chordata	
Class: Mammalia	
Order: Primates	
Family: Hominidae	
Genus: Homo	Lumbricus
Species: <i>Homo sapiens</i>	<i>Lumbricus terrestris</i>

Taxon Separating Characteristics:

Phylum Annelida	Class Oligocheata
1. Segmented	1. Few segments
2.	2.
3.	3.

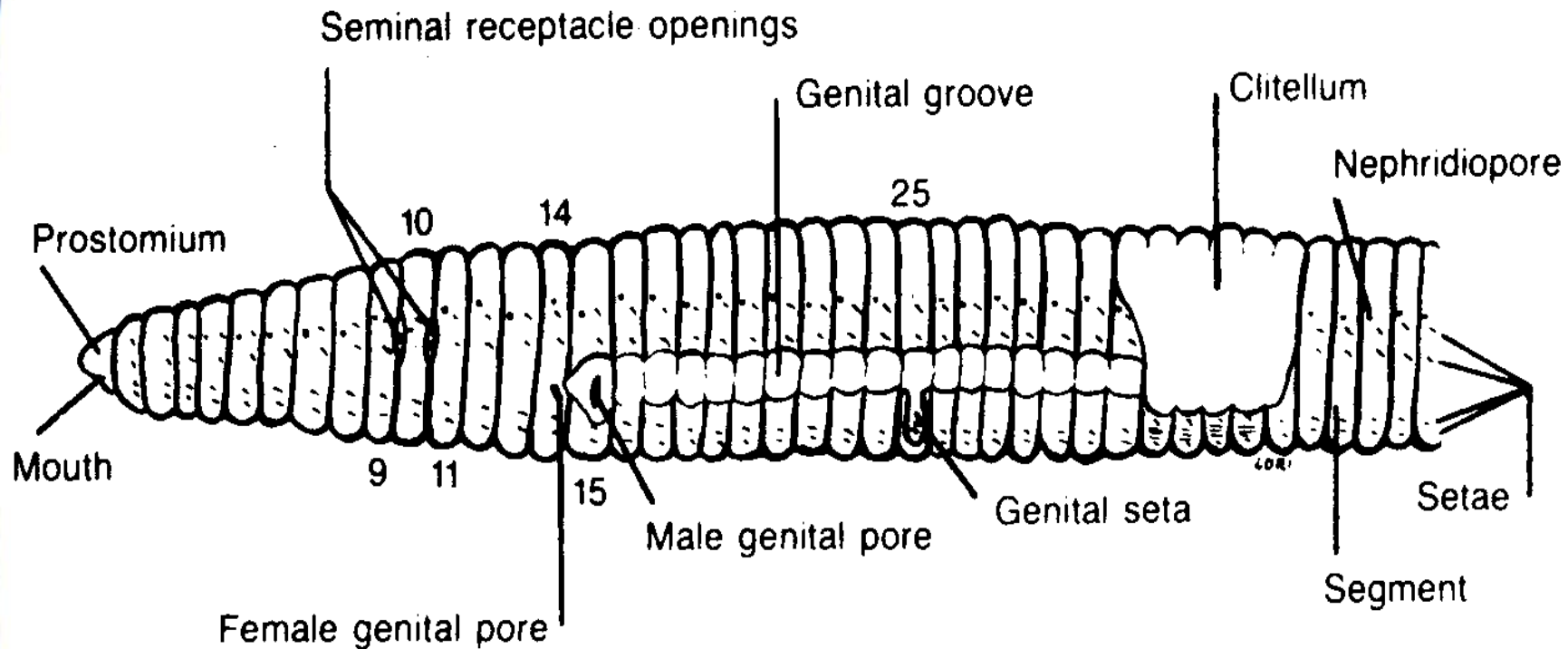
Observable Traits:

Reproduction and development

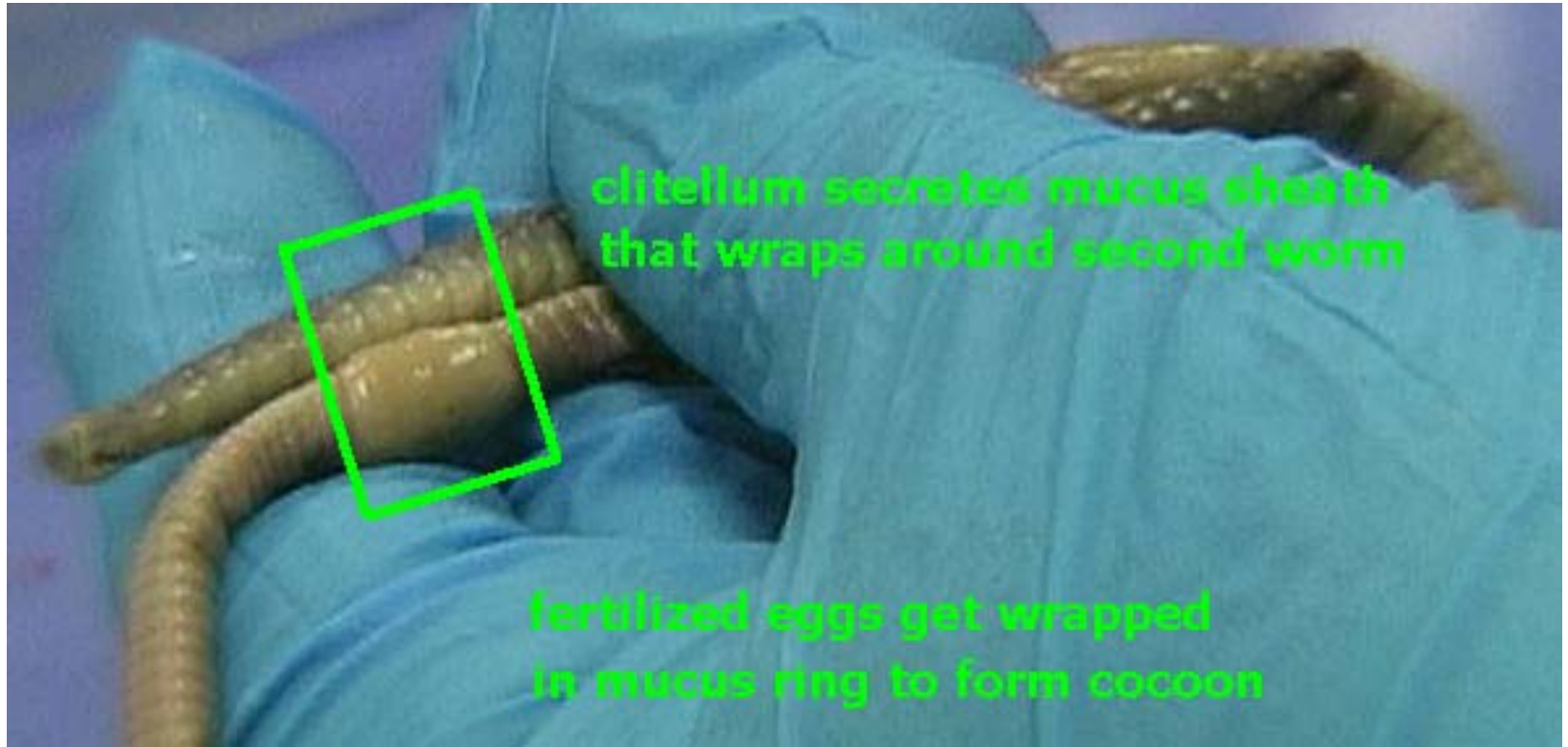
- Evidence of sexual dimorphism (separate sexes)?
- Sexual vs asexual reproduction?
- Type of fertilization?

Lumbricus terrestris:

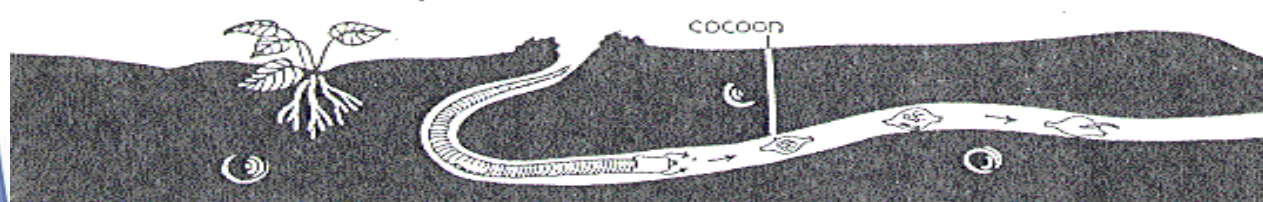
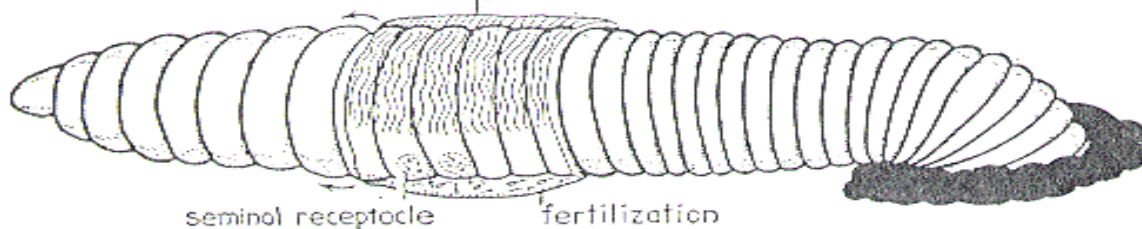
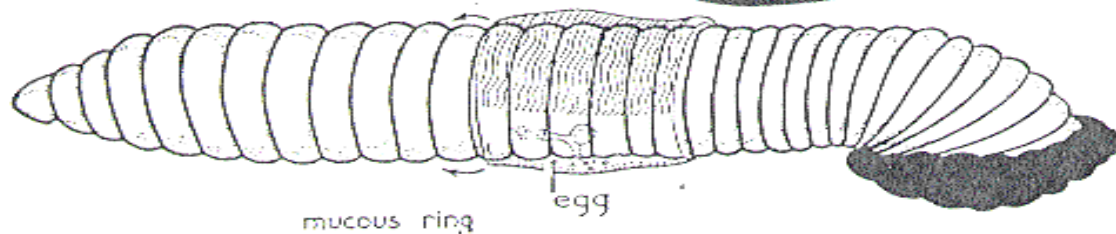
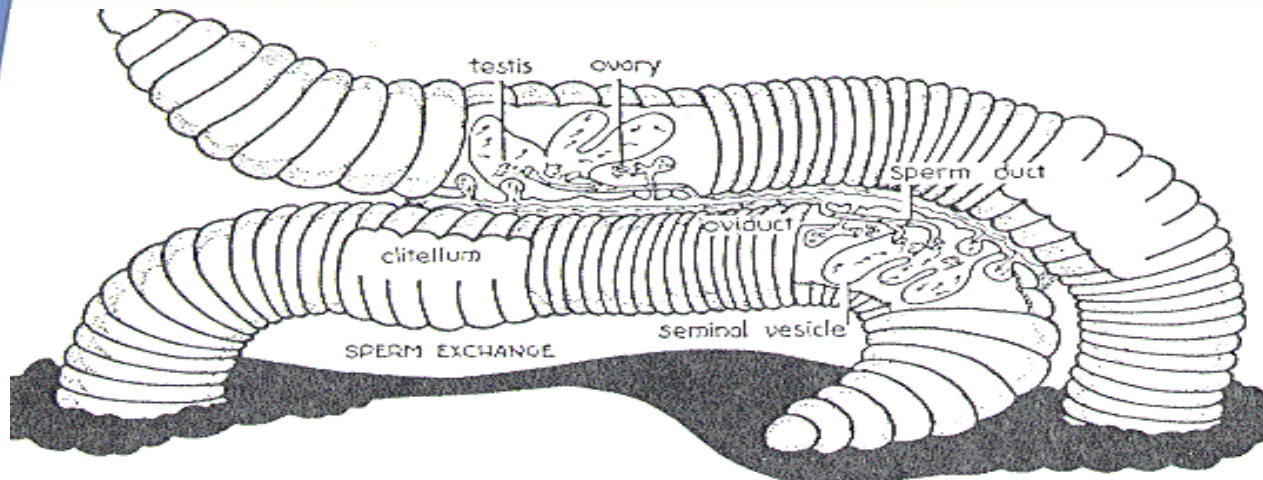
The earthworm is **hermaphroditic**.



Sexual Reproduction:

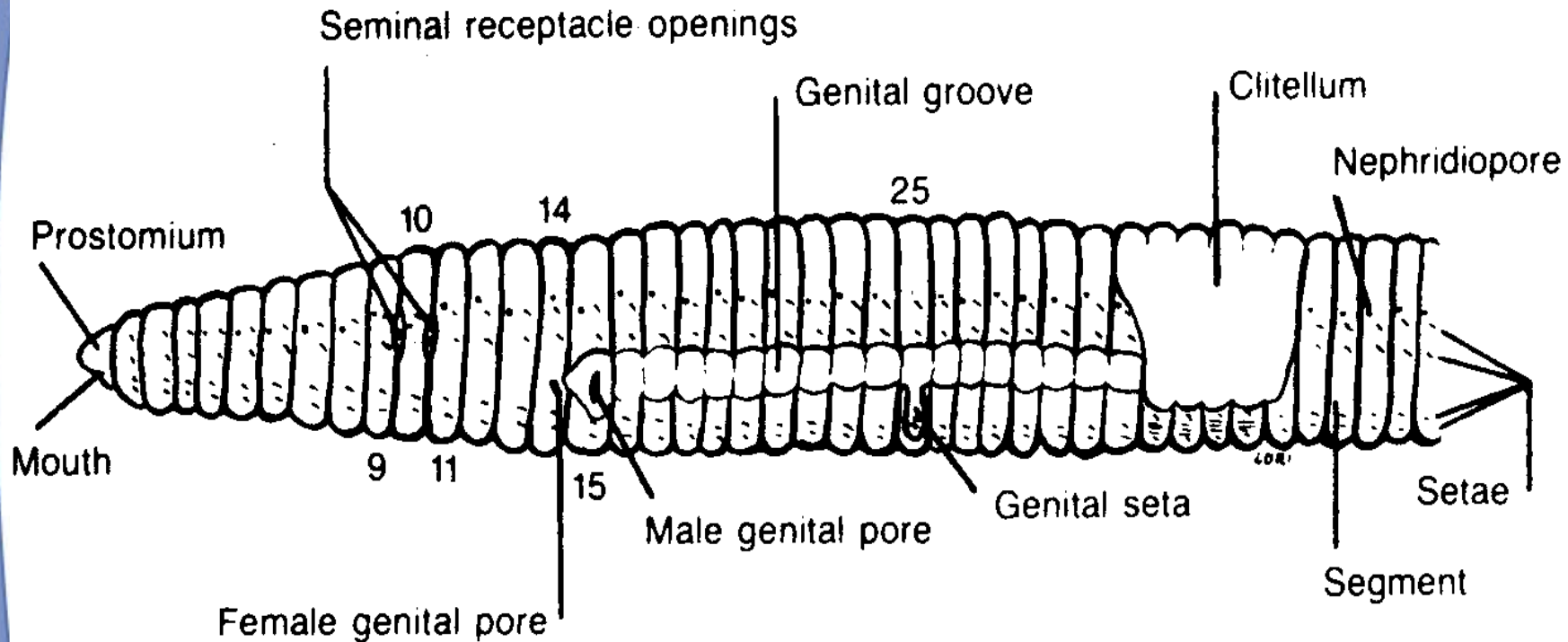


Carolina Bioreview® Sheets:



To Locate Structures:

Count Segments



Segment Identification Chart:

- 1 Mouth/ prostomium
- 10 Seminal receptacle openings
- 14 Female genital pore
- 15 Male genital opening
- 15-32 Genital groove
- 25 Genital seta
- 32 Clitellum

Think About These Characteristics:

- Body covering?
- Adaptations for gas exchange?
- Sensory organs?
- Visible appendages?
- Endothermic or ectothermic?

Record observations in a chart.

Based on Observations:

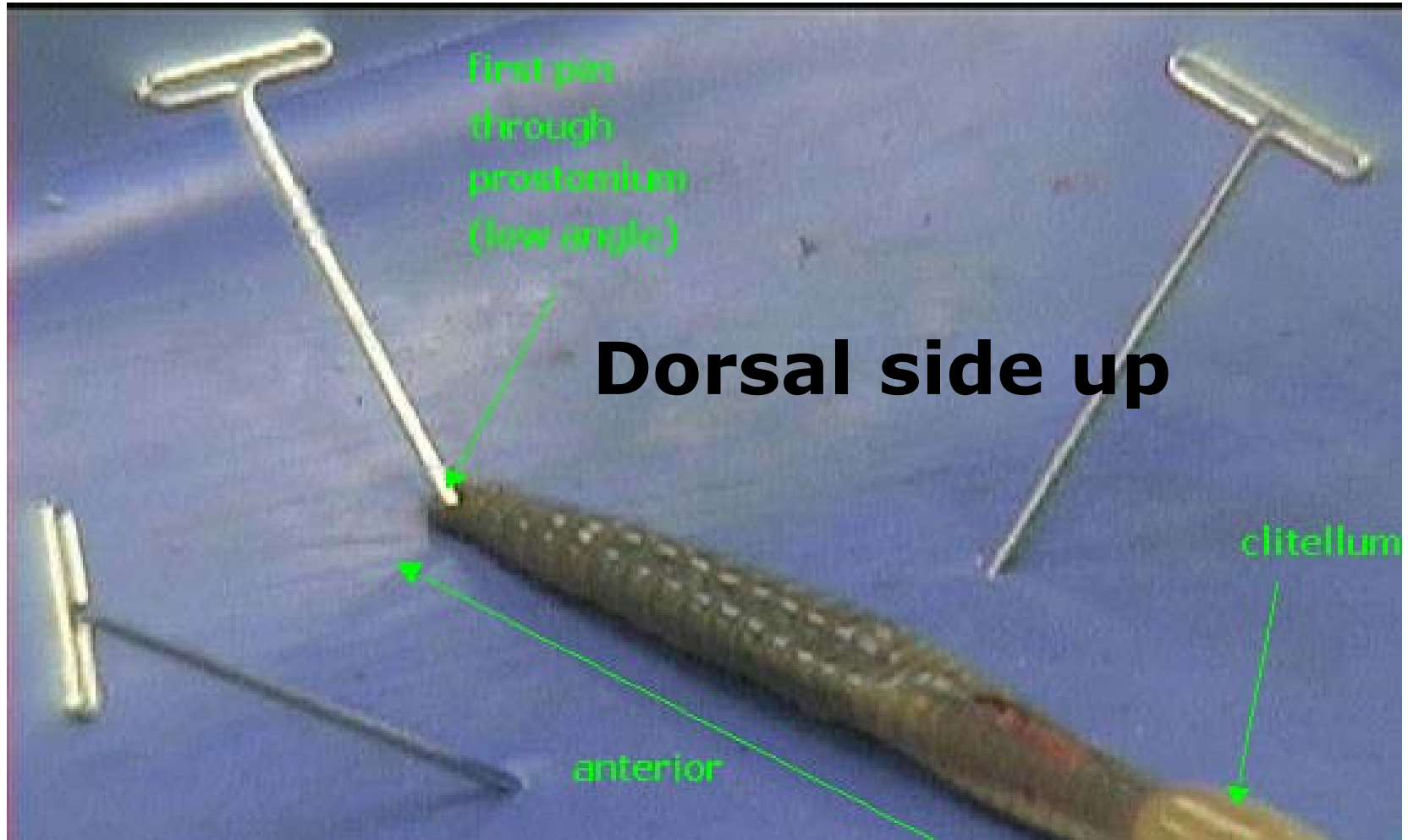
Consider . . .

- Means of feeding?
- Evidence of complete digestive tract?
- Locomotion?
- Other special characteristics?
- Ecological importance?

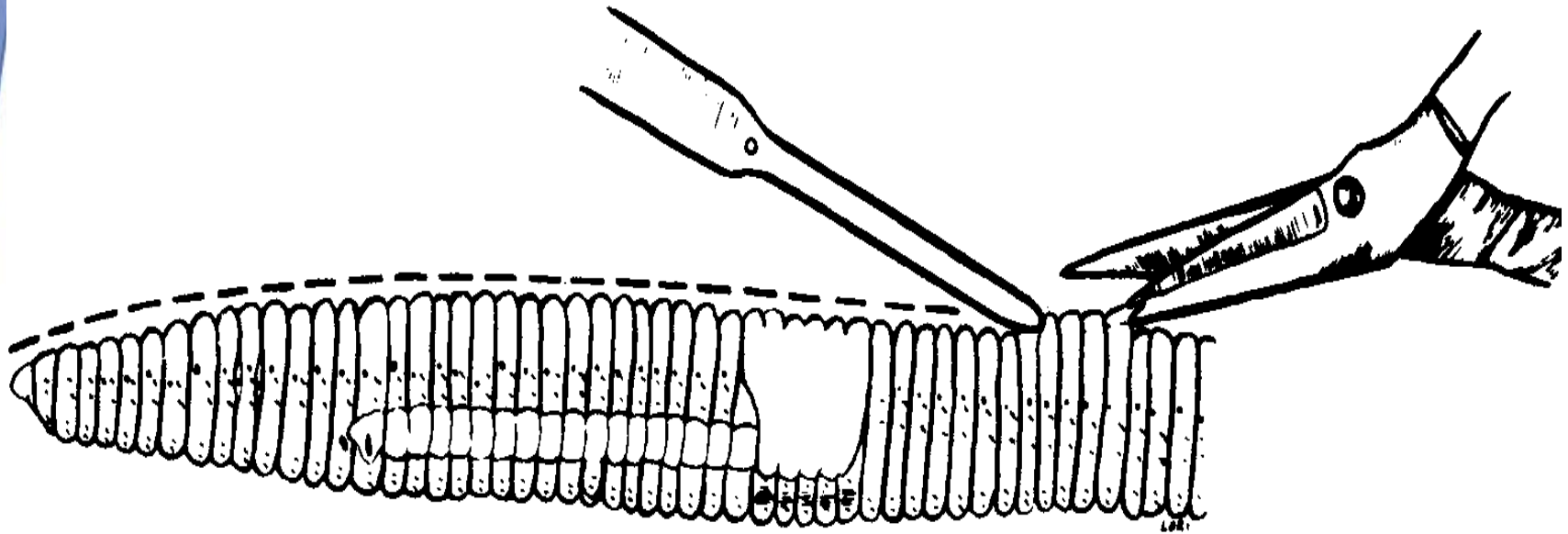
Dissection Rules:

- If you are not using the instrument, **lay it down.** Do not stick points into trays!
- **INSTRUMENT CARE:** When finished: WIPE, DRY, and RETURN TO PROPER LOCATIONS

Exploring Internal Anatomy:



Begin Dissection Posterior to Clitellum:



Cut along dorsal midline anteriorly through segment #1

Making incisions/scapel:

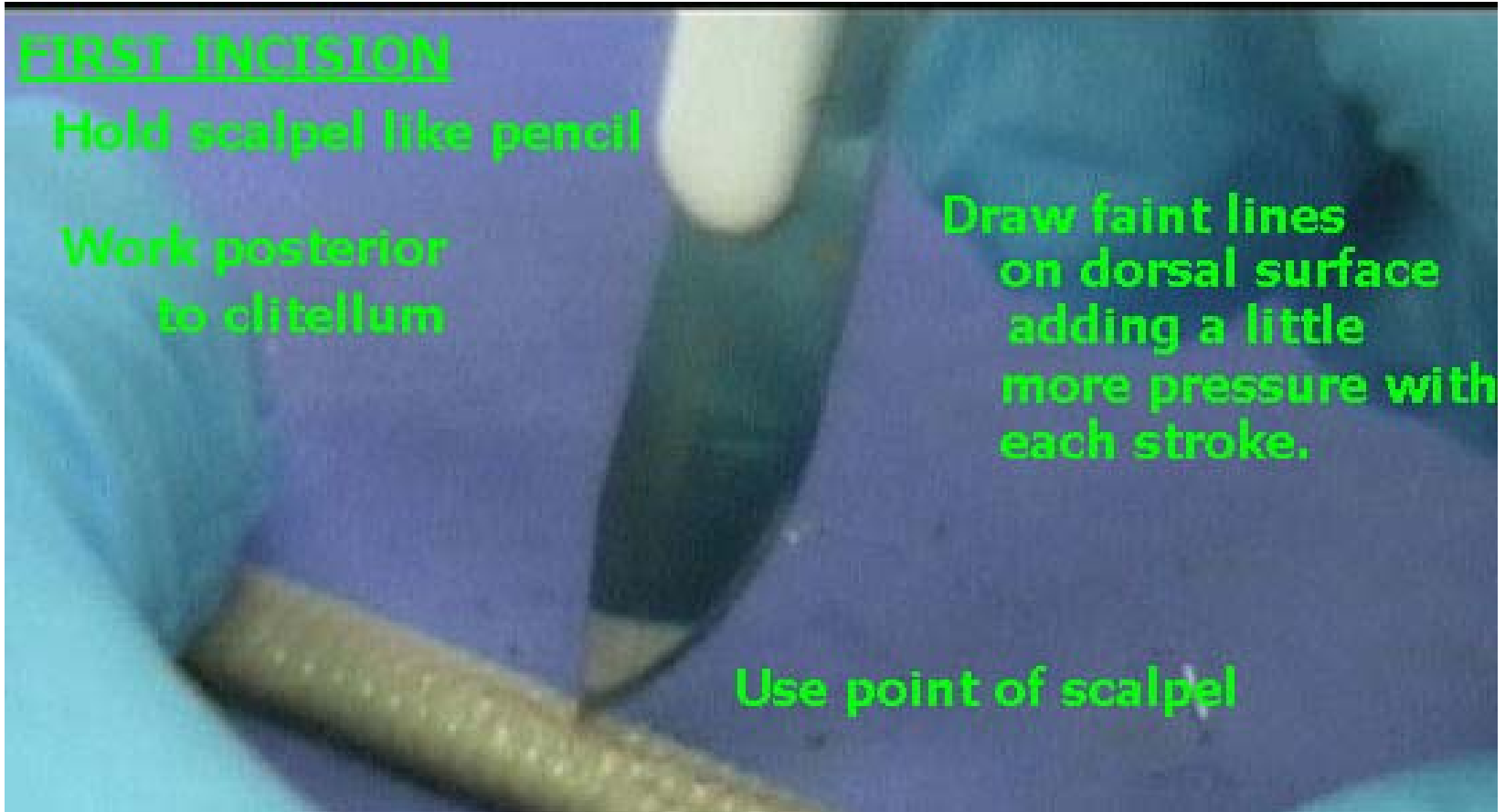
FIRST INCISION

Hold scalpel like pencil

Work posterior
to clitellum

Draw faint lines
on dorsal surface
adding a little
more pressure with
each stroke.

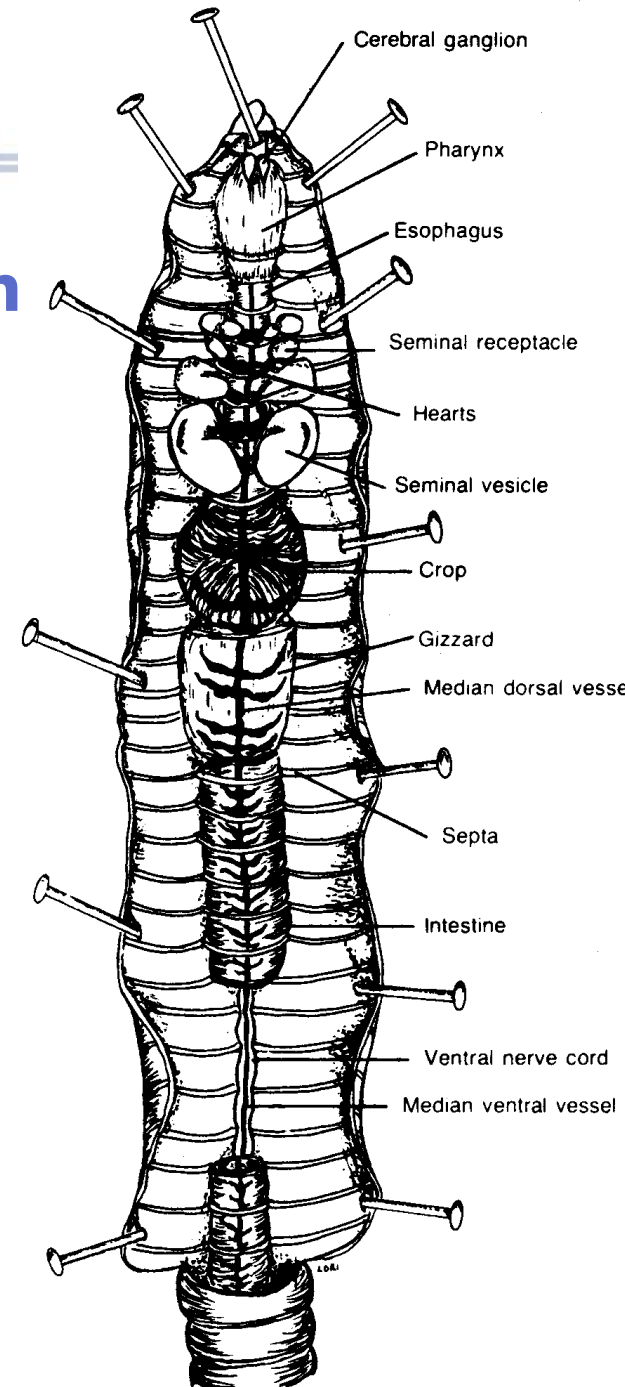
Use point of scalpel



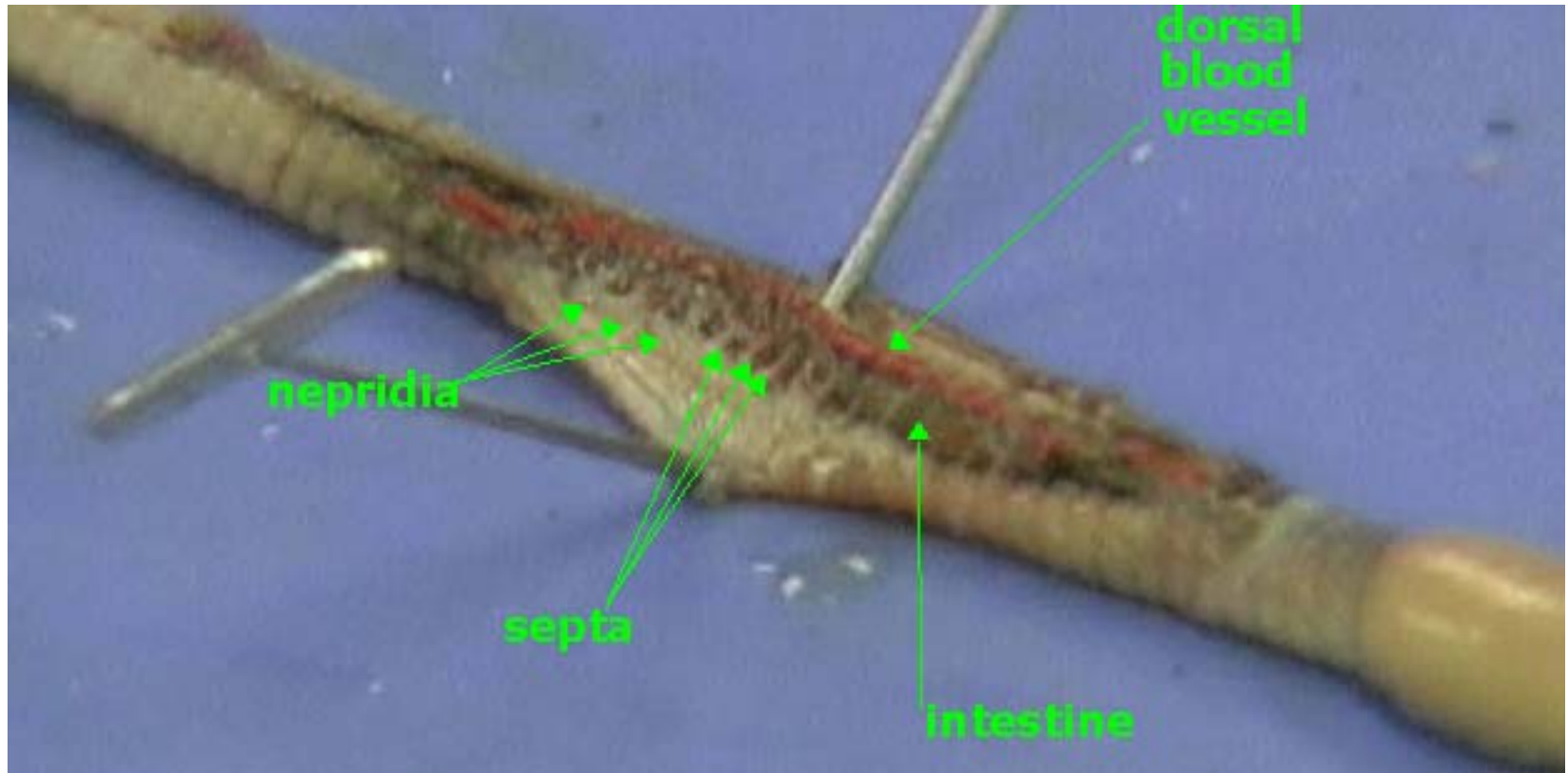
Tips for Dissection

- 1. Slide pins in at a low angle from side (allows better view and manipulation)**

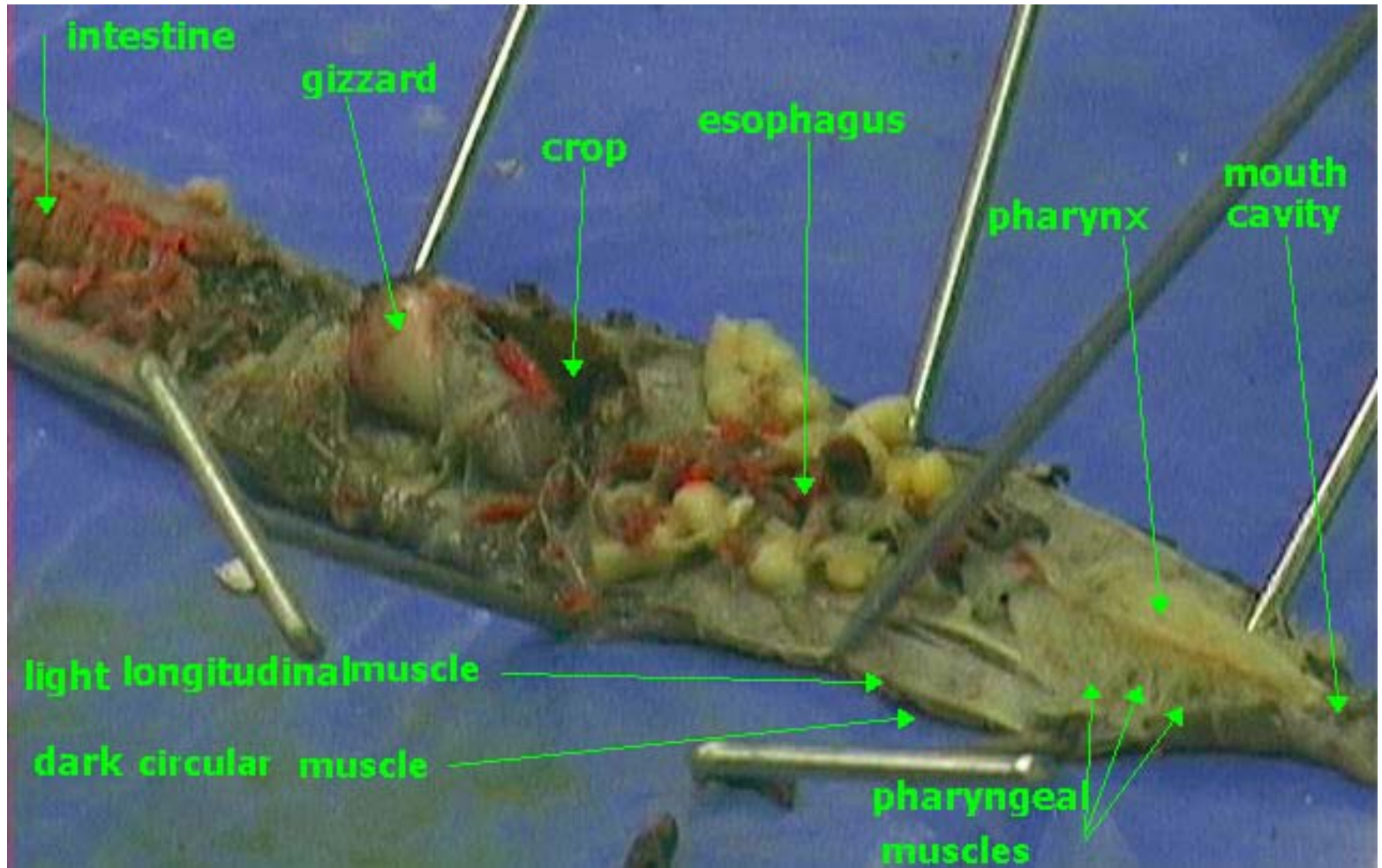
Low pin angle



Tip: Use Wash Bottle to Clear Debris



Internal Anatomy:



Inferring Function From Structure:

- Gather evidence of complete digestive tract?
- Trace food through the digestive tract.
- Visible differences in digestive organs?

Specialized Digestive Organs:

- Explore and describe the different structures making up the digestive tube.
- Determine the location of each from the following descriptions

Locate the Following Organs:

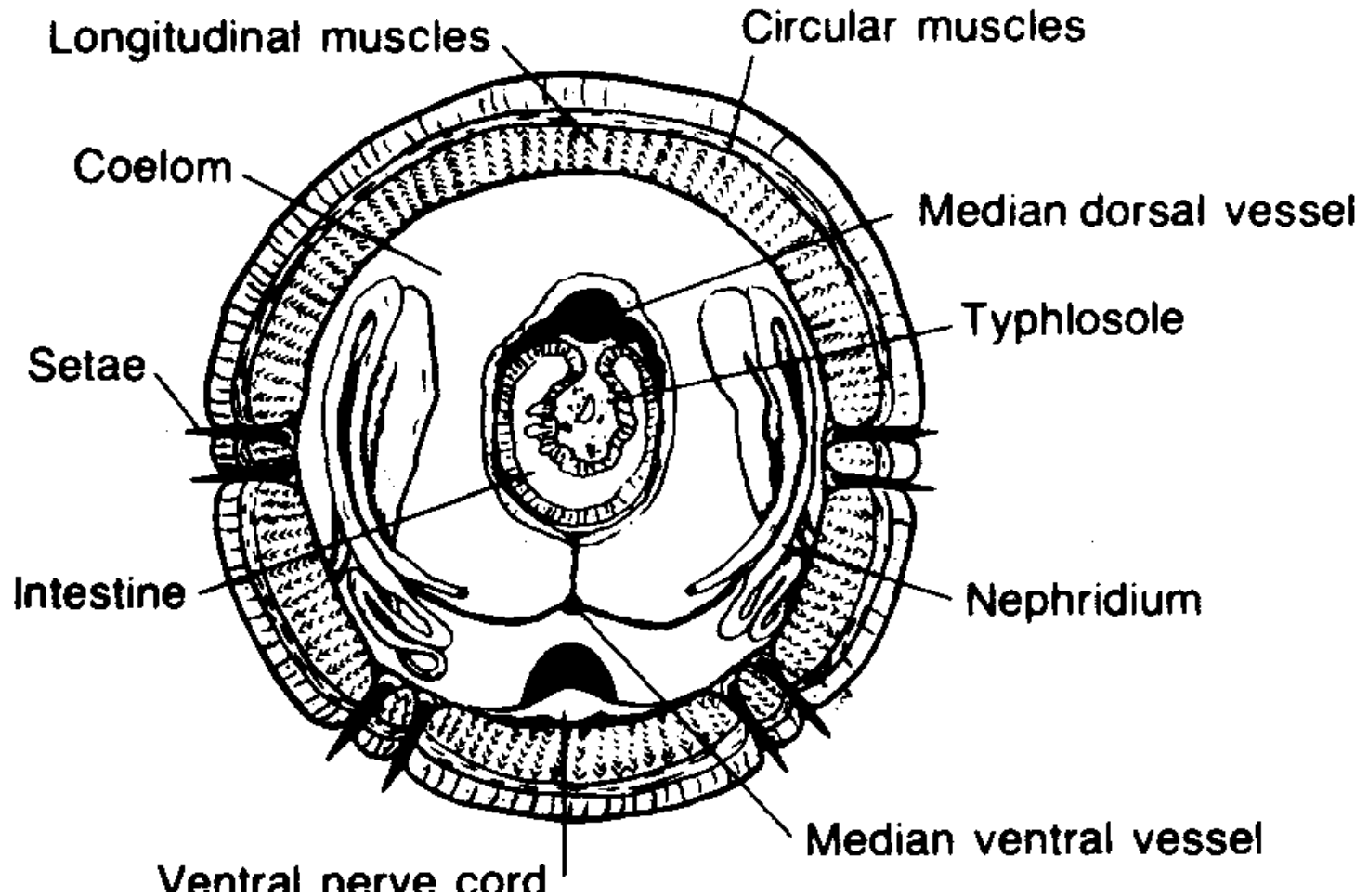
- Pharynx—muscular for swallowing food
- Gizzard—firm muscular grinding organ
- Crop—thin sac for food storage
- Intestine—long tube extends to the anus

Arrange them in the correct order.

Septa Indentification (Internal):

- 1-2 Mouth cavity
- 3-5 Pharynx
- 6-11 Esophagus/hearts
- 12-14 Crop
- 15-17 Gizzard (tough)
- 18+ Intestines
- last Anus

The Earthworm Is *Coelomate*



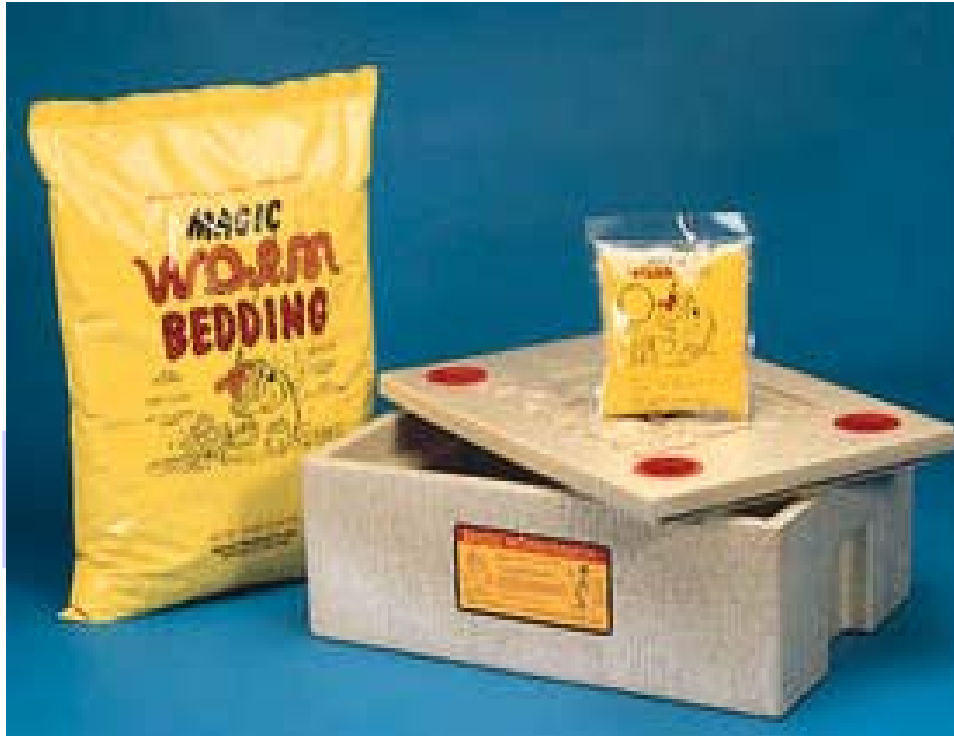
Animal Development Milestones:



The earthworm demonstrates all 10 body systems of man!

- Segmentation
- Eucoelomate
- Dividing walls (septa) separate segments
- Complete digestive tract that is compartmentalized
- Closed circulatory system with pumping organ (aortic arches)
- Nerve cord

Opportunity for Student Research:



- Easy to culture
- Well understood
- Interesting regeneration studies

Earthworm Dissection BioKit® :

- For a class of 30
- Includes 30 earthworms
- 30 self-locking storage bags
- 30 student guides
- Teacher's manual

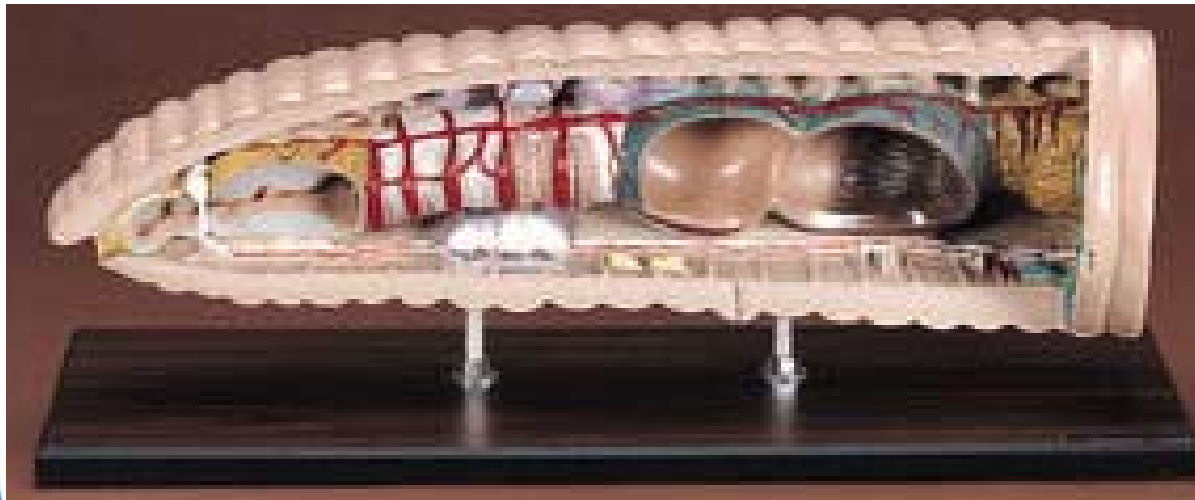


More Resources from Carolina:

Supporting materials:



**Video: *Anatomy of the Earthworm,*
and
Earthworm Model**



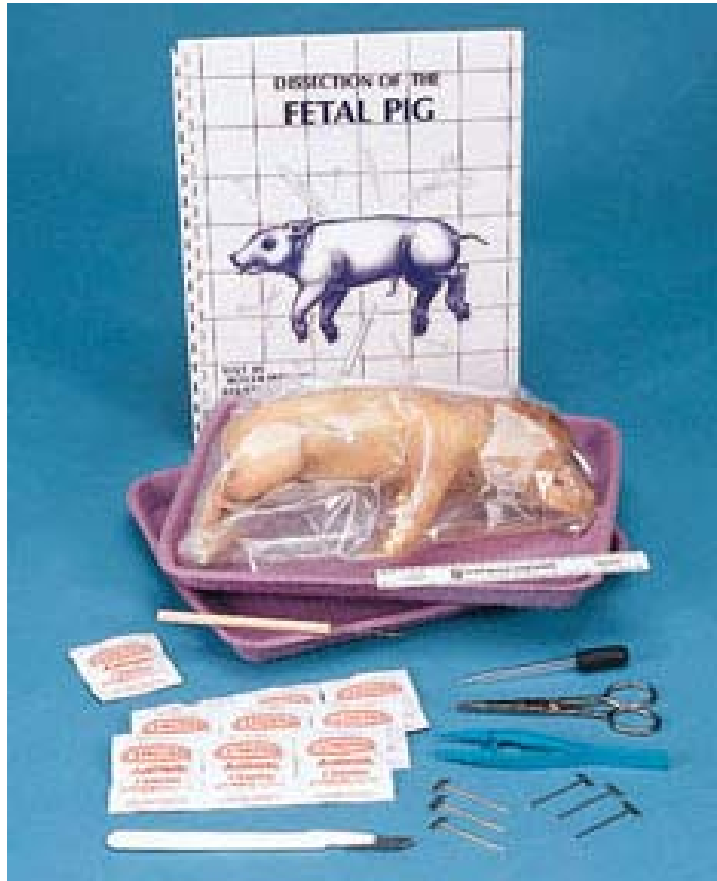
Dissection Alternatives:

BioLab®:
Invertebrates
contains 4
dissection labs
in one CD-
ROM: the
earthworm,
crayfish,
starfish, and
squid



CD-ROM Cat # 39-9014

Carolina Can Meet All Your Dissection Needs:



With top-quality specimens and supplies



Carolina's Perfect Solution®

- A revolutionary, proprietary combination of fast-acting chemicals that give **long-lasting** tissue fixation and **preservation without the health and safety issues** associated with the strong, obnoxious formaldehyde fumes

Carolina Biological Supply Company

Thank you for your time and continued dedication to teaching hands-on science in your classrooms.

Marilyn Pendley